(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 502 623 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
02.09.1998 Bulletin 1998/36

(51) Int Cl.[6]: **G03B 7/26**, G01R 31/36

(21) Application number: **92301248.8**

(22) Date of filing: **14.02.1992**

(54) **Battery system for camera**

Batteriesystem für eine Kamera

Dispositif de batterie pour caméra

(84) Designated Contracting States:
DE FR GB

(30) Priority: **06.03.1991 JP 63803/91**
07.03.1991 JP 65367/91

(43) Date of publication of application:
09.09.1992 Bulletin 1992/37

(60) Divisional application: **96113811.2 / 0 750 215**

(73) Proprietor: **NIKON CORPORATION**
Tokyo (JP)

(72) Inventors:
- **Isono, Kenji**
  Narashino-shi, Chiba-ken (JP)
- **Goto, Tetsuro**
  Funabashi-shi, Chiba-ken (JP)

(74) Representative: **Burke, Steven David et al**
R.G.C. Jenkins & Co.
26 Caxton Street
London SW1H 0RJ (GB)

(56) References cited:
DE-A- 3 803 310
US-A- 4 662 736
US-A- 4 792 762
US-A- 4 965 738

- **PATENT ABSTRACTS OF JAPAN vol. 13, no. 146 (P-854)11 April 1989 & JP-A-63 309 874**
- **PATENT ABSTRACTS OF JAPAN vol. 14, no. 258 (P-1055)4 June 1990 & JP-A-2 069 730**

EP 0 502 623 B1

Printed by Jouve, 75001 PARIS (FR)

Description

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a battery system including a battery pack, for use in a camera for electric power supply to various electric and electronic components provided in the camera body of a still camera, and more particularly to such battery system provided with means for measuring the remaining capacity of the battery.

Related Background Art

Also in the field of still cameras, there have recently been marked introductions of electronic systems, as in the equipment of other fields. For this reason, various electric and electronic components, such as focal plane shutter, automatic exposure control mechanism, automatic film winding mechanism etc., are incorporated in the camera body as the loads for battery power source. Such transition toward the electronic systems is imposing various requirements on the battery to be incorporated in the camera body, such as a larger capacity, a lower cost, and a structure of easier use and better appearance.

The battery conventionally used in such still cameras has usually been a UM-3 type which is relatively easily available, and such battery is either directly loaded in a battery chamber formed in a part of the camera body or loaded in a battery pack that can be loaded into the camera body. The camera utilizing such battery is usually equipped with a simple battery check circuit for detecting the level of exhaustion of battery, and said circuit can be activated by the shutter release button of the camera or by an exclusive checking button and shows the result of checking in the view finder or in an indicator provided on the outside of the camera. The battery checking for detecting the level of exhaustion of UM-3 battery needs only to measure the open terminal voltage of the battery, because of discharge characteristics thereof, and requires only a simple circuit in the camera body.

In such still cameras, however, instead of primary battery that can only be used one time, such as UM-3 battery, there is desired the use of a rechargeable secondary battery pack, such as of nickel-cadmium batteries, because of a lower running cost, superior low temperature characteristics and preference by professional photographers.

JP-A-2069730 describes a battery check device which is provided with detecting means which detect the type of battery used as a power source and a decision time varying means which has plural different decision times for deciding whether or not the capacities of the batteries used as the power source are proper.

US-A-4,965,738 describes an intelligent battery system which senses the current flowing in the direction of a charging current through positive and negative terminals and the battery cells of a battery pack. A processor within the battery pack transmits battery parameter data to separate output port of the battery pack. The battery parameter data includes the state of charge of the battery cells, temperature data and the type of battery pack.

SUMMARY OF THE INVENTION

Figs. 1 and 2 illustrate a battery system of a camera, utilizing a secondary battery pack.

In these drawings, a phototaking lens 4 is mounted on the front face of a camera body 2. A view finder 5 is provided for confirming the object image. The photographer, while looking into said view finder, depresses an unrepresented shutter release button in order to expose the film to the object image.

In the lower part of the camera body 2, there is provided a battery pack chamber 6, in which a secondary battery pack 1 is detachably loaded.

Said secondary battery pack 1, having a resin case incorporating plural nickel-cadmium batteries therein, is provided at the external end thereof with a rectangular head portion 1a for facilitating the mounting into the camera body, also with two electrodes 7, 8 at the end of an insert portion 1b, and with a charging receptacle 9 on a side wall thereof.

Such secondary battery pack 1 is loaded in a lateral direction into a chamber 6 of the camera as shown in Figs. 1 and 2, whereupon the electrodes 7, 8 contact unrepresented electrodes correspondingly provided in the camera, and various parts thereof are powered by the batteries in the secondary battery pack 1.

When the secondary batteries in said pack 1 are exhausted, the user can recharge said batteries by extracting the pack 1 in lateral direction from the chamber 6 by holding the head portion 1a and inserting a charging plug 10 of a charger 3 into the charging receptacle 9. An AC plug 11 connected to the charger can be inserted into a receptacle of a commercial power line.

Such secondary battery pack 1 is equipped with a circuit (not shown) for calculating the remaining capacity of the nickel-cadmium batteries therein and a display unit 12 for indicating the remaining capacity of said batteries, determined by said circuit. In such nickel-cadmium battery, the remaining capacity can be displayed by integrating the dimension of charging current of the charger 3 and the dimension of discharging current used for powering the internal mechanisms of the camera body. Such remaining capacity display unit 2 is usually composed of a liquid crystal display device including plural segments of so-called bar graph shape and is adapted to indicate the remaining capacity by the length of a bar, based on the result obtained by the remaining capacity detecting circuit. Said display unit 12 may also

be composed of a light-emitting diode array, which can be activated by a button actuation. Such display unit 12 can most simply be provided, for example on the end face of the rectangular head portion 1a of the battery pack 1, as shown in Figs. 1 and 2.

However, in such structure, the display unit 12 may not be readily recognizable while the camera is in use, since said unit is positioned at the side of the camera.

In designing a camera utilizing such secondary battery pack, it is also necessary to consider the use of non-reusable primary batteries (for example UM-3 batteries) in the form of a battery pack, and, for this reason, there is conceived to incorporate an aforementioned battery check circuit for the primary battery in the camera body. The selection of such pack for the primary batteries and that for the secondary batteries is made in consideration of the balance of frequency of use of batteries and of cost acceptable in the camera. In fact, the battery checking circuit and the display unit for such primary battery pack can, in a necessary minimum structure, be best incorporated in the camera body. In such configuration, however, in case of using a secondary battery pack equipped with a remaining capacity display circuit, there will coexist said remaining capacity display circuit and the battery check circuit for the primary battery provided in the camera body, and there may result a drawback that the user may misjudge the remaining capacity by activating said battery check circuit of the camera body for the primary battery while using a secondary battery pack.

The secondary battery, such as nickel-cadmium battery, employed in the above-mentioned secondary battery pack, is repeatedly usable by recharging, but becomes unusable after charge-discharge cycles of several hundred times. Consequently the liquid crystal display unit 14, provided on the secondary battery pack 1, increases the cost thereof, thus leading to an unnecessarily increased burden to the user.

In accordance with the present invention, there is provided a camera to which two different types of battery means are selectively mountable, said camera comprising:

means for determining the remaining capacity of the mounted battery means; and
discrimination means for discriminating between said different types of battery means,

characterised in that said discrimination means is arranged to discriminate between a primary battery means including a non-reusable primary battery and a secondary battery means including a reusable secondary battery, measurement means for measuring the amount of discharge of said secondary battery and calculation means for calculating the remaining capacity of the secondary battery based on the result of measurement by said measurement means, in that said determining means comprises communicating means for receiving a signal from said secondary battery means when mounted on the camera, said signal being related to the remaining capacity of the mounted secondary battery means,

and in that the camera further comprises a battery check circuit for checking the capacity of said primary battery means and display means for displaying the remaining capacity of said primary battery means and said secondary battery means, wherein said discrimination means is responsive to said signal from said secondary battery means received through a first terminal and to a voltage from said primary battery means received through a second terminal.

Thus, in the selective use of the primary battery and the secondary battery pack, it is in accordance with the present invention possible to simplify the configuration and to prevent the misjudgment of the user in that the result of battery check of the primary battery and the remaining capacity of the secondary battery can be indicated by same display means.

Preferably, the display means is observable from the rear side of the camera body when either said primary battery means or said secondary battery means is mounted on the camera body.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic exploded perspective view of a camera utilizing a secondary battery pack;
Fig. 2 is a schematic perspective view of the secondary battery pack shown in Fig. 1, in a state mounted to the camera;
Fig. 3 is a schematic exploded perspective view of an embodiment of the present invention; and
Figs. 4 and 5 are circuit diagrams showing the circuit structure respectively in the use of a secondary battery pack and a primary battery pack.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now the present invention will be clarified in detail by preferred embodiments thereof shown in the attached drawings.

Figs. 3 to 5 illustrate an embodiment of the present invention, in which the camera body 2 can be selectively loaded with a secondary battery pack 1 including a reusable secondary battery 220 as mentioned above, or a primary battery pack 240 including a non-reusable primary battery such as an ordinary UM-3 battery or a lithium battery.

As shown in Fig. 3, such a camera is provided, for the primary battery pack 240, with a battery check button 243, a display unit 224 therefor, and an internal battery check circuit for the primary battery. Said internal circuit is activated by the depression of the check button 243, to turn on the display unit 224 in case the remaining ca-

pacity is sufficient, or to turn on said unit intermittently or to extinguish the display in case the remaining capacity is insufficient.

The configuration of this embodiment is featured by a fact that the remaining capacity of the battery is displayed on the display unit 224 provided on the rear face of the camera body 2, regardless whether the pack I or 240 is mounted. When the primary battery pack 240 is mounted, said display is given in response to the depression of the check button 243, but, when the secondary battery pack 1 is mounted, said display is always given on the display unit 224.

The primary battery pack 240, to be loaded in a chamber 6 of the camera body 2, is provided, as shown in Fig. 3, with a battery chamber 242 for detachably accommodating batteries 241. Also on the inserted end of said pack 240, there are provided discharging terminals 7, 8 similar to those in the aforementioned secondary battery pack 1, and a pack detecting terminal 244. Said secondary battery pack 1 and primary battery pack 240 are formed in a substantially same shape, and have said discharging terminals 7, 8 in mutually corresponding positions on the inserted end. However, as shown in Fig. 3, the signal transmitting terminal 222 in the secondary battery pack 1 and the identifying terminal 244 in the primary battery pack 240 are provided in different positions, and, in the connection to the camera body 2, form respectively different wiring states with the display unit 224 (display circuit 223) as shown in Figs. 4 and 5, thereby functioning as means for identifying the mounted pack.

In the camera body 2, as shown in the righthand portion in Figs. 4 and 5, the terminal 222 receiving the signal, indicating the remaining capacity of the secondary battery 220, from the pack I is connected to the display circuit 223 including the display unit 224. On the other hand, when the primary battery pack 240 is mounted, the identifying terminal 244 functions as a ground terminal for a discrimination circuit 245 of which input is connected to said terminal 222 and the display circuit 223, and said discrimination circuit can be activated by a contact linked with the aforementioned battery check button 243.

When the secondary battery pack 1 is mounted to the camera body 2 in the above-explained configuration, the display circuit 223 and the display unit 224 are connected through the terminal 222 to said pack while the descrimination circuit 245, identifying terminal 244 and check button 243 are excluded from the circuit, whereby the remaining capacity of the secondary battery 220 can be displayed by the signal from the calculation circuit 221 of the pack 1, as shown in Fig. 4.

On the other hand, when the primary battery pack 240 is mounted, the above-mentioned terminal 222 for the secondary battery is unconnected as shown in Fig. 23 and the display circuit 223 is grounded through the discrimination circuit 245. In such state, the depression of the check button 243 selectively activates the discrimination circuit 245, whereby the remaining capacity of the battery at this point can be displayed on the display unit 224. Said discrimination circuit 245, activated by the closing of the battery check button 243, is designed to measure the battery voltage when a current is given to an unrepresented resistor in said circuit. Since said resistor has to have a low resistance, said circuit cannot be operated continuously but is to be activated only in response to the depression of the check button 243.

In the foregoing there has been explained a case of loading primary batteries in the primary battery pack, but such primary batteries may be directly loaded in a loading chamber of the camera body. In such case, the primary batteries may be formed similar to the primary battery pack, or said loading chamber may be formed similar to the primary battery.

The present invention is not limited to the foregoing embodiments but is subject to variations or modifications in the form and/or structure of the camera body, battery pack, charger etc. For example, the secondary battery in the foregoing embodiments is composed of nickel-cadmium battery, but similar effects can naturally be obtained with other re-usable batteries such as a lead battery.

Also the position and direction of mounting of the battery pack in the camera body are naturally not limited to the structure of the foregoing embodiments in which the pack is mounted laterally in the lower part of the camera body.

Claims

1. A camera (2) to which two different types of battery means (1, 240) are selectively mountable, said camera comprising:

   means for determining the remaining capacity of the mounted battery means; and
   discrimination means (245) for discriminating between said different types of battery means,

   characterised in that said discrimination means is arranged to discriminate between a primary battery means (240) including a non-reusable primary battery (241) and a secondary battery means (1) including a reusable secondary battery (220), measurement means (229, 230) for measuring the amount of discharge of said secondary battery and calculation means (221) for calculating the remaining capacity of the secondary battery based on the result of measurement by said measurement means,

   in that said determining means comprises communicating means (222) for receiving a signal from said secondary battery means when mounted on the camera, said signal being re-

lated to the remaining capacity of the mounted secondary battery means,
and in that the camera further comprises a battery check circuit (245) for checking the capacity of said primary battery means (240) and display means (223) for displaying the remaining capacity of said primary battery means (240) and said secondary battery means (1), wherein said discrimination means is responsive to said signal from said secondary battery means (1) received through a first terminal (222) and to a voltage from said primary battery means (240) received through a second terminal (244).

2. A camera according to claim 1, wherein said display means displays the remaining capacity of the primary battery means (240) in response to depression of a battery check button (243).

3. A camera according to claim 1 or 2, wherein when said secondary battery means (1) is mounted on the camera, the display means (223) always displays the remaining capacity of the secondary battery means (1).

4. A camera according to any of claims 1 to 3, wherein said display means is responsive to said discrimination means.

5. A camera according to any of claims 1 to 4, wherein the display of said display means is observable from the rear side of the camera body when either said primary battery means (240) or said secondary battery means (1) is mounted on the camera body.

6. A camera according to any of claims 1 to 5, further comprising said first battery means (1) and/or said second battery means (240).

Patentansprüche

1. Kamera (2), an der zwei unterschiedliche Typen von Batterieeinrichtungen (1, 240) selektiv befestigbar sind, wobei die Kamera aufweist:

   eine Einrichtung zum Bestimmen der verbleibenden Kapazität der befestigten Batterieeinrichtung; und

   eine Diskriminierungseinrichtung (245) zum Diskriminieren zwischen den unterschiedlichen Typen von Batterieeinrichtungen,

   dadurch gekennzeichnet, daß die Diskriminierungseinrichtung so angeordnet ist, um zwischen einer primären Batterieeinrichtung (240), die eine nicht wiederverwendbare primäre Batterie (241) umfaßt, und einer sekundären Batterieeinrichtung (1) zu diskriminieren, die eine wiederverwendbare sekundäre Batterie (220) umfaßt, eine Meßeinrichtung (229, 230) zum Messen der Entladungsmenge der sekundären Batterie und eine Berechnungseinrichtung (221) zum Berechnen der verbleibenden Kapazität der sekundären Batterie, basierend auf dem Ergebnis der Messung der Meßeinrichtung, umfaßt,

   daß die Bestimmungseinrichtung eine Kommunikationseinrichtung (222) zum Aufnehmen eines Signals von der sekundären Batterieeinrichtung, wenn sie an der Kamera befestigt ist, aufweist, wobei das Signal zu der verbleibenden Kapazität der befestigten, sekundären Batterieeinrichtung in Bezug gesetzt wird,

   und daß die Kamera weiterhin einen Batterieprüfschaltkreis (245) zum Prüfen der Kapazität der primären Batterieeinrichtung (240) und eine Anzeigeeinrichtung (223) zum Anzeigen der verbleibenden Kapazität der primären

   Batterieeinrichtung (240) und der sekundären Batterieeinrichtung (1) aufweist, wobei die Diskriminierungseinrichtung auf das Signal von der sekundären Batterieeinrichtung (1), aufgenommen über einen ersten Anschluß (222), und auf eine Spannung von der primären Batterieeinrichtung (240), aufgenommen über einen zweiten Anschluß (244), ansprechend ist.

2. Kamera nach Anspruch 1, wobei die Anzeigeeinrichtung die verbleibende Kapazität der primären Batterieeinrichtung (240) in Abhängigkeit eines Niederdrückens einer Batterieprüftaste (243) anzeigt.

3. Kamera nach Anspruch 1 oder 2, wobei dann, wenn die sekundäre Batterieeinrichtung (1) an der Kamera befestigt ist, die Anzeigeeinrichtung (223) immer die verbleibende Kapazität der sekundären Batterieeinrichtung (1) anzeigt.

4. Kamera nach einem der Ansprüche 1 bis 3, wobei die Anzeigeeinrichtung auf die Diskriminierungseinrichtung ansprechend ist.

5. Kamera nach einem der Ansprüche 1 bis 4, wobei die Anzeige der Anzeigeeinrichtung von der Rückseite des Kameragehäuses beobachtbar ist, wenn entweder die primäre Batterieeinrichtung (240) oder die sekundäre Batterieeinrichtung (1) an dem Kameragehäuse befestigt ist.

6. Kamera nach einem der Ansprüche 1 bis 5, die weiterhin die erste Batterieeinrichtung (1) und/oder die

zweite Batterieeinrichtung (240) aufweist.

Revendications

1. Appareil photographique (2) dans lequel deux types différents de moyens de batterie (1, 240) peuvent être montés au choix, ledit appareil photographique comprenant :

   des moyens pour déterminer la capacité restante des moyens de batterie montés; et
   des moyens de discrimination (245) pour discriminer entre lesdits différents types de moyens de batterie,

   caractérisé en ce que lesdits moyens de discrimination sont faits pour discriminer entre des premiers moyens de pile (240) comportant une première pile non réutilisable (241) et des seconds moyens de batterie d'accumulateurs comportant une seconde batterie d'accumulateurs réutilisable (220), des moyens de mesure (229, 230) permettant la mesure de la valeur de décharge de ladite seconde batterie d'accumulateurs et des moyens de calcul (221) permettant le calcul de la capacité restante de la seconde batterie d'accumulateurs à partir du résultat de la mesure faite par lesdits moyens de mesure,

   en ce que lesdits moyens de détermination comprennent des moyens de communication (222) pour recevoir un signal provenant desdits seconds moyens de batterie d'accumulateurs quand ils sont montés sur l'appareil photographique, ledit signal étant en rapport avec la capacité restante des seconds moyens de batterie d'accumulateurs montés,
   et en ce que l'appareil photographique comprend en outre un circuit de contrôle de pile (245) pour contrôler la capacité desdits premiers moyens de pile (240) et des moyens d'affichage (223) pour afficher la capacité restante desdits premiers moyens de pile (240) et desdits seconds moyens de batterie d'accumulateurs (1), dans lequel lesdits moyens de discrimination sont sensibles audit signal provenant desdits seconds moyens de batterie d'accumulateurs (1) reçu par une première borne (222) et à une tension provenant desdits premiers moyens de pile (240) reçue par une deuxième borne (244).

2. Appareil photographique selon la revendication 1, caractérisé en ce que lesdits moyens d'affichage affichent la capacité restante des premiers moyens de pile (240) en réponse à l'enfoncement d'un bouton de contrôle de pile (243).

3. Appareil photographique selon la revendication 1 ou 2, caractérisé en ce que lesdits seconds moyens de batterie d'accumulateurs (1) sont montés sur l'appareil photographique, les moyens d'affichage (223) affichent toujours la capacité restante des seconds moyens de batterie d'accumulateurs (1).

4. Appareil photographique selon l'une quelconque des revendications 1 à 3, caractérisé en ce que lesdits moyens d'affichage sont sensibles auxdits moyens de discrimination.

5. Appareil photographique selon l'une quelconque des revendications 1 à 4, caractérisé en ce que l'affichage desdits moyens d'affichage est observable à partir de la face arrière du boîtier de l'appareil photographique quand soit lesdits premiers moyens de pile (240) soit lesdits seconds moyens de batterie d'accumulateurs (1) sont montés sur le boîtier de l'appareil photographique.

6. Appareil photographique selon l'une quelconque des revendications 1 à 5, comprenant en outre lesdits premiers moyens de pile (1) et/ou lesdits seconds moyens de batterie d'accumulateurs (240).

FIG. 1

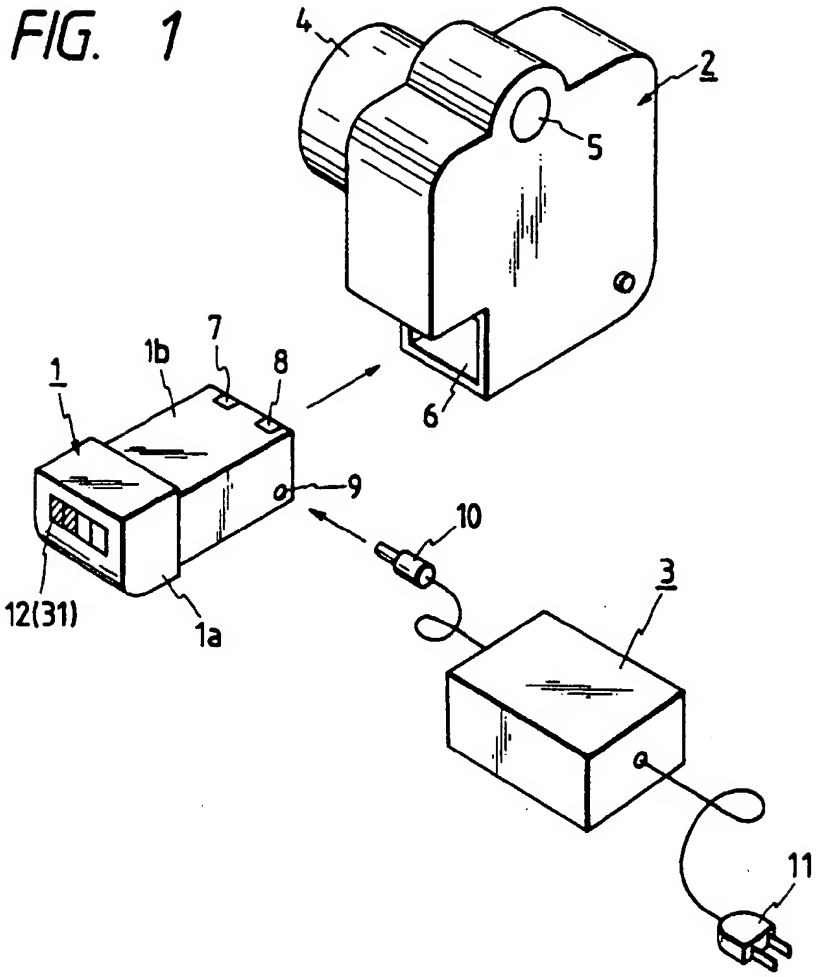


FIG. 2

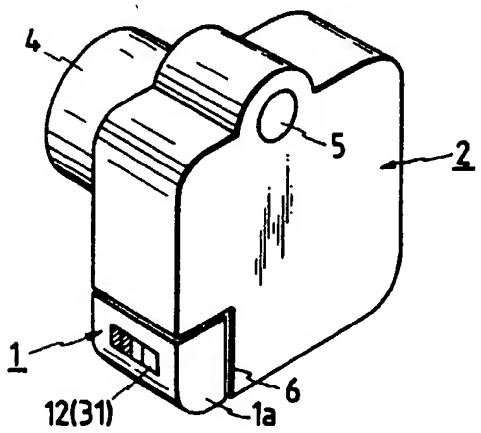


FIG. 3

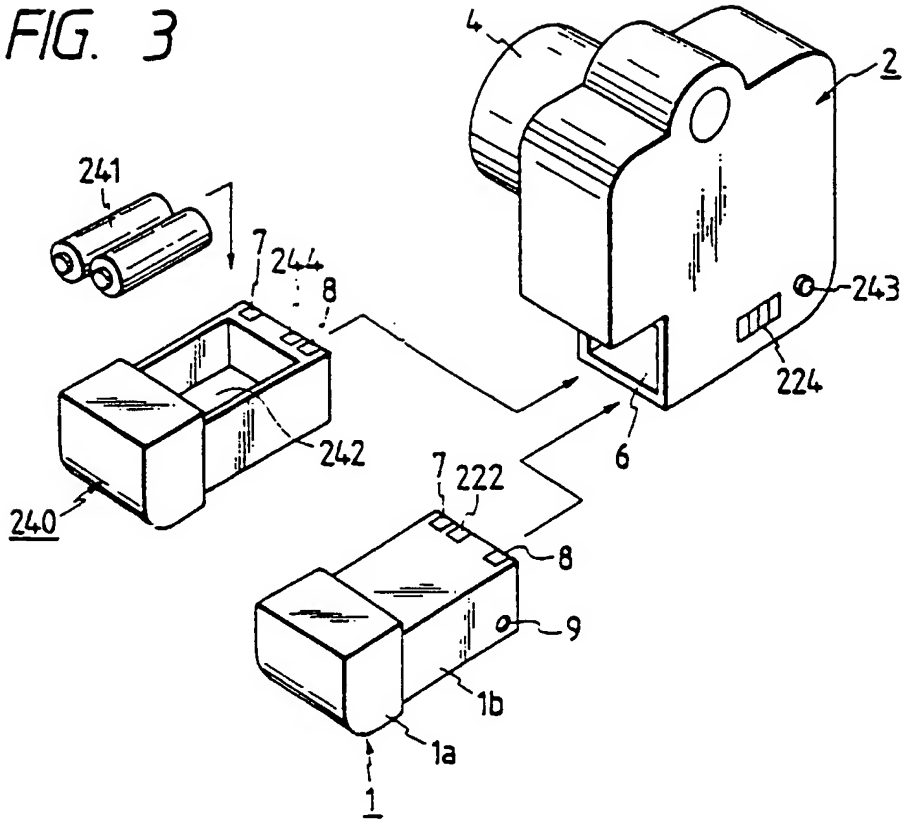


FIG. 4

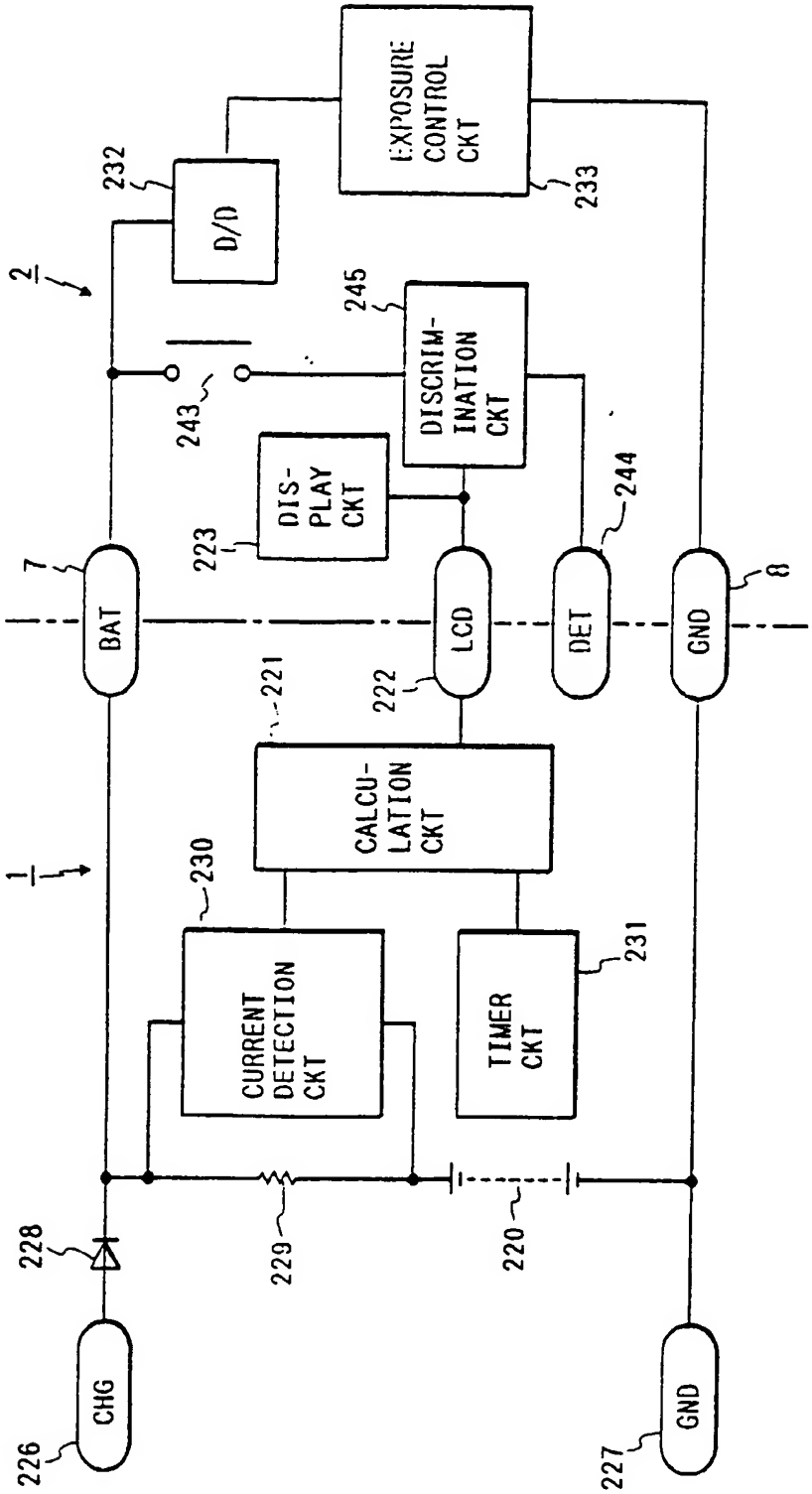
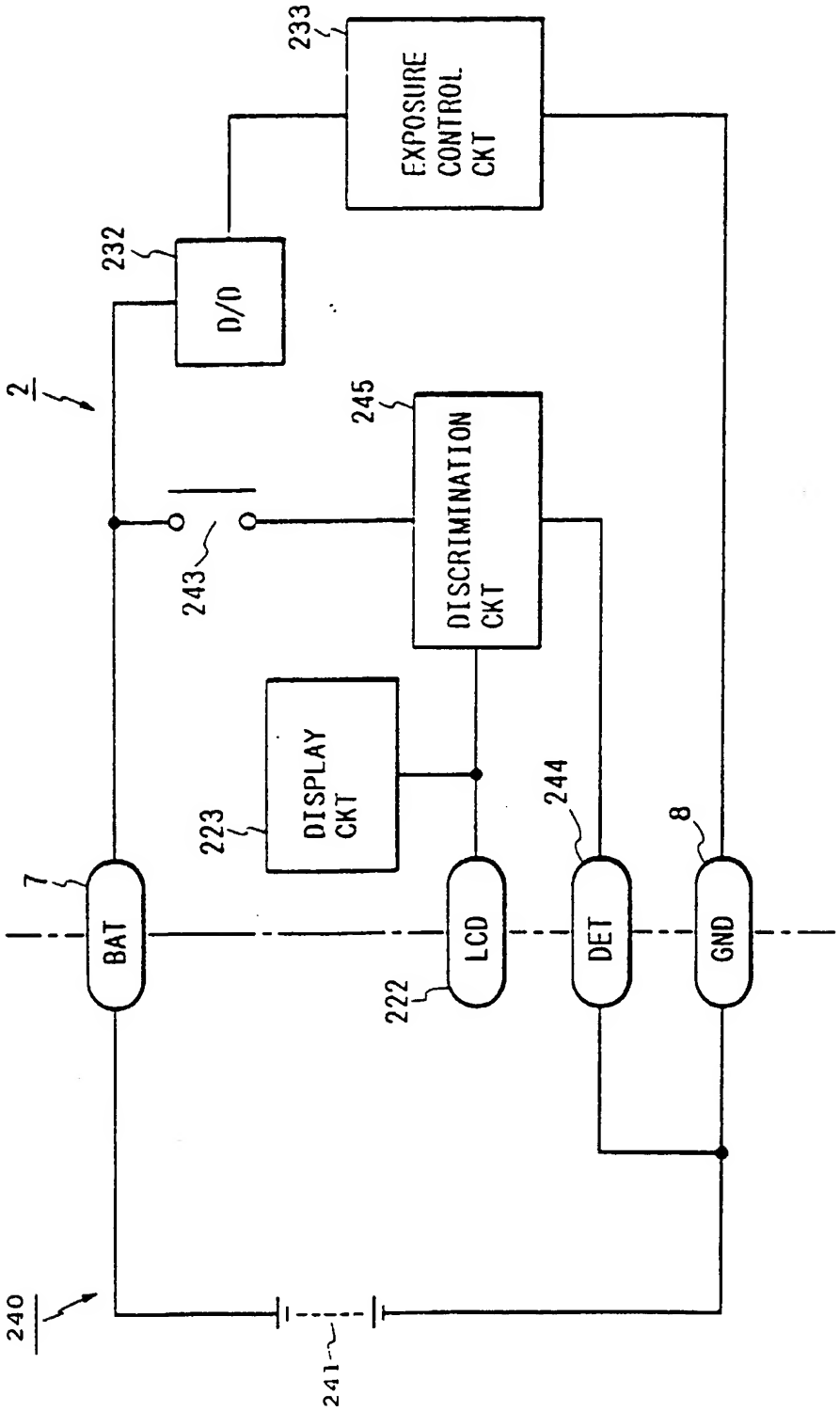

EXPOSURE CONTROL CKT
233
D/D
232
2
245
DISCRIM-INATION CKT
243
DIS-PLAY CKT
223
244
7
BAT
LCD
DET
GND
8
221
222
CALCU-LATION CKT
1
230
CURRENT DETECTION CKT
TIMER CKT
231
228
229
220
CHG
226
GND
227

FIG. 5


233
EXPOSURE CONTROL CKT
232
D/D
2
245
DISCRIMINATION CKT
243
223
DISPLAY CKT
7
BAT
LCD
222
244
DET
8
GND
240
241